

REMARKS

Claims 1, 3-8, 10, 15, and 21-27 remain pending in this application. Claim 1 is independent. Claims 1, 2, 7, 8, 10, 15, and 21 have been amended, and no claims have been canceled or added by this amendment.

Claims 2, 9, and 11-14 were previously canceled, and claims 16-20 were previously withdrawn and canceled as being directed to the non-elected invention.

Rejections under §112, 1st Paragraph

Withdrawal of the rejection of claims 1, 2, 4-8, 10, 15, and 21-27 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement, is requested.

Independent claim 1, from which all pending claims variously and ultimately depend, has been amended to remove the limitation referred to by the Examiner in the Official Action.

Rejections under §112, 2nd Paragraph

Withdrawal of the rejection of claims 7-10 under 35 U.S.C. §112, second paragraph, as being indefinite, is requested.

Claim 7 has been amended in a manner which removes the stated basis for indefiniteness.

Rejections under §103(a) over Desai et al. in view of Park

Withdrawal of the rejection of claims 1, 2, 4-8, 10, 15, and 21-27 under 35 U.S.C. §103(a) as being unpatentable over Desai et al. (US 6,303,480) in view of Park (US 6,281,118) is requested. Not only does the suggested combination not teach or suggest all the claimed limitations, the references are again submitted as not being properly combinable due to improper motivation to combine, as discussed below. Park teaches away from at least one aspect of the claimed invention.

Case Law Relating to Unpatentability

At the outset, Applicant notes that, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, ***the prior art reference must teach or suggest all the claim limitations.***¹ Further, ***the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure.***²

An essential evidentiary component of an obviousness rejection is a teaching or suggestion or motivation to combine the prior art references.³ Combining prior art references without evidence of a suggestion, teaching or motivation simply takes the inventors' disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight.⁴

It is impermissible within the framework of 35 U.S.C. §103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art.⁵ Further in this regard, As the Court of Customs and Patent Appeals, predecessor to the Federal Circuit, has held:

All relevant teachings of cited references must be considered in determining what they fairly teach to one having ordinary skill in the art. The relevant portions of a reference include not only those teachings which would suggest particular aspects of an invention to one having ordinary skill in the art, but also those teachings which would lead such a person away from the claimed invention.⁶

¹ See MPEP §2143.

² *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) and See MPEP §2143.

³ *C.R. Bard, Inc. v. M3 Systems, Inc.*, 48 USPQ2d 1225 (Fed. Cir. 1998)

⁴ *Interconnect Planning Corp. v. Feil*, 227 USPQ 543 (Fed. Cir. 1985)

⁵ *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 230 USPQ 416 (Fed. Cir. 1986).

⁶ *In re Mercier*, 185 USPQ 774, 778 (CCPA 1975).

The rejections in the Official Action amount, in substance, to nothing more than hindsight reconstruction of Applicants' invention by relying on isolated teachings of the applied art, without considering the overall context within which those teachings are presented. Without benefit of Applicants' disclosure, a person having ordinary skill in the art would not know what portions of [Desai et al. and Park] to consider, and what portions to disregard as irrelevant or misleading.⁷

Finally, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.⁸ All words in a claim must be considered in judging the patentability of that claim against the prior art.⁹ When evaluating the scope of a claim, every limitation in the claim must be considered.¹⁰ The evidentiary record fails to teach each limitation of the claimed invention.

Deficiencies With Respect to the Claimed Invention

As for the deficiencies of the applied art with respect to the claimed invention, the applied art, taken alone or in combination, does not teach or suggest a method of filling an opening in an oxide layer, over a liner layer formed on a surface of a silicide substrate underlying both the oxide layer and the liner layer, which includes, among other features, "forming a first continuous sacrificial layer...completely covering the oxide layer and the liner layer; forming a second layer, comprising a refractory material, on the first continuous sacrificial layer...so as to cover the first layer and to also substantially fill the opening; and during said forming a second layer, sacrificing at least a portion of the first continuous sacrificial layer, ***wherein said sacrificing at least a portion of the first continuous sacrificial layer ensures against a deterioration of the silicide substrate underlying both the oxide layer and the liner layer***", as recited in independent claim 1, as amended.

A description of the technical problem solved by Applicants' claimed invention may be

⁷ *In re Wesslau*, 147 USPQ 391, 393 (CCPA 1965).

⁸ *In re Royka* 180 USPQ 580 (CCPA 1974).

⁹ *In re Wilson*, 165 USPQ 494 (CCPA 1970) and see MPEP § 2143.03.

¹⁰ *In re Ochiai*, 37 USPQ2d 1127 (Fed. Cir. 1995) and see MPEP § 2144.08.

found at least at page 2, lines 4-18 of the instant Specification, and support for the newly-added limitation indicated above may be found at least at page 6, line 25 through page 7, line 2 of the Specification.

Concerning the deficiencies of the applied art, Desai et al. does not teach or suggest forming a first *continuous sacrificial layer* comprising silicon, which completely covers the oxide layer and the liner layers, as recited in independent claim 1. The silicon layer of Desai et al. is *only* on the sidewalls of the contact hole, and does not completely cover *both* the oxide and liner layers of Desai et al. Desai et al. is admitted as being deficient by the Examiner in disclosing the invention recited in the pending claims insofar as "...the layer completely covering the oxide layer is not discussed, the temperature of the CVD process for depositing the conductive contact is not discussed, the silicon being a polysilicon film is not discussed and the temperature for CVD of the layers is not discussed."¹¹

Deficient Motivation to Combine – Park Teaches Away

The Examiner offers Park as making up for the deficiencies of Desai et al. by the assertion that it would have been obvious to modify Desai et al. by Park's utilization of "polysilicon and certain deposition temperatures...because it allows for stabilizing a contact interface and for the deposition of layers."¹² The Examiner further offers the second doped polysilicon layer 28a as teaching the recited "first continuous layer comprising silicon...".

However, Applicants point out that the stated motivations to make such modifications, i.e., that depositing polysilicon allows for stabilizing a contact interface, and that utilizing Park's disclosed temperature ranges during CVD allows for deposition of the layers, are facially deficient not only because Park teaches away from at least one aspect of Applicants' invention, as discussed below, but also because the stated motivations relied upon by the Examiner are submitted as not being germane to the technical problem solved by Applicants' claimed invention.

¹¹ See Official Action at p. 7, first full paragraph.

¹² See Official Action at p. 9, first and second full paragraphs.

Park teaches away from at least one aspect of the claimed invention, in that Park teaches the desirability of reacting the refractory material with the silicon material. ***Park sets out to intentionally react tungsten (W) with silicon (Si) to form WSi_x , whereas Applicants' Specification specifically disfavors such reactions,*** and discusses such reactions as representing known conventional problems, and further discusses the undesirability of such reactions. Applicants' disclosure and claimed invention specifically set out to avoid the exact situation encouraged by Park et al.

In this respect, Applicants invention uses and claims the lower temperature of deposition of the refractory material to ensure that such a reaction as mentioned above does not occur. Further, and as claimed, at least a portion of the first continuous sacrificial layer of silicon is sacrificed to ensure against a deterioration ***of the silicide substrate underlying both the oxide layer and the liner layer.*** Neither Desai or Park teach or suggest this claimed limitation.

Therefore, Applicants submit that person having skill in the art would not be motivated to combine Desai et al. with Park in the manner suggested by the Examiner to solve Applicants' stated problems, particularly because Park teaches away from at least one aspect of Applicants' claimed invention.

Further Deficiencies in the Teachings of Park

As for the Examiner's statements concerning the deposition temperature of W, and considering that Park may disclose a range of temperatures for deposition, Park fails to overcome the above-discussed deficiencies of Desai with respect to rendering obvious the present invention. In particular, Park does not disclose that a refractory metal layer is to be deposited at a temperature lower than temperature used for depositing a silicon layer. Park merely provides temperature ranges that ***can be*** employed for both the silicon layer and metal silicide layer, which temperatures overlap each other. Accordingly, the temperature employed for the silicide layer ***could be*** the same as, lower than, or higher than the temperature employed to provide the silicon layer. This lack of specificity in Park is submitted as not providing the requisite definiteness for use in asserting the teaching of such a limitation.

Furthermore, it would not be apparent to employ the temperature range performing the silicon layer in Park, since such layer has a thickness significantly greater than the mono layer of Si *required* by Desai et al..

The mere fact that cited art *may be* modified in the manner suggested by the Examiner does not make this modification obvious, unless the cited art suggest the desirability of the modification.¹³ No such suggestion appears in the cited art in this matter.

In *Dembiczak et al.*, the Court at 1617 stated: “Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. See, e.g., *C.R. Bard, Inc., v. M3 Sys., Inc.*, 157 F.3d. 1340, 1352, 48 USPQ2d. 1225, 1232 (Fed. Cir. 1998) (describing ‘teaching or suggestion motivation [to combine]’ as in ‘essential evidentiary component of an obviousness holding’), *In re Rouffet*, 149 F. 3d 1350, 1359, 47 USPQ2d. 1453, 1459 (Fed. Cir. 1988) (‘the Board must identify specifically... the reason one of ordinary skill in the art would have been motivated to select the references and combining them’)...”.

Also, the cited art lacks the necessary direction or incentive to those or ordinary skill in the art to render the rejections under 35 U.S.C. §103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attainable by the claimed invention needed to sustain a rejection under 35 U.S.C. 103.¹⁴

¹³ See *In re Lee* 61 USPQ2d 1430 (Fed. Cir. 2002), *In re Dembiczak et al.* 50 USPQ2d. 1614 (Fed. Cir. 1999), *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984), *In re Laskowski*, 10 USPQ2d. 1397 (Fed. Cir. 1989), and *In re Fritch*, 23, USPQ2d. 1780 (Fed. Cir. 1992).

¹⁴ See *Diversitech Corp. v. Century Steps, Inc.* 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 185 USPQ 774 (CCPA 1975), and *In re Naylor*, 152 USPQ 106 (CCPA 1966).

Finally, Applicants reiterate that, as would be known to a person having skill in the art, depositing the refractory material at a lower temperature slows the deposition rate, to reduce the formation of gaps or seams in the deposited layer, and also reduces the reaction of W with Si to form WSi_x , for example. Such formation is specifically disfavored in the disclosed and claimed invention, as discussed above.

Therefore, reconsideration and allowance of claims 1, 2, 4-8, 10, 15, and 21-27 are requested.

Rejections under §103(a) over Park in view of Desai et al.

Withdrawal of the rejection of claims 1, 2, 4-8, 10, 15, and 21-27 under 35 U.S.C. §103(a) as being unpatentable over Park (US 6,281,118) in view of Desai et al. (US 6,303,480) is requested. Not only does the suggested combination not teach or suggest all the claimed limitations, the references are again submitted as not being properly combinable due to improper motivation to combine, as discussed above. Park teaches away from at least one aspect of the claimed invention.

In the interests of brevity, Applicants point out that the suggested combination is still deficient with respect to the recitation of independent claim 1 of “...*wherein said sacrificing at least a portion of the first continuous sacrificial layer ensures against a deterioration of the silicide substrate underlying both the oxide layer and the liner layer.*” The discussion above is also relevant to this rejection.

Further, Park teaches away from any combination to render obvious Applicants’ claimed invention, because Park teaches the desirability of reacting the refractory material with the silicon material. As previously discussed, *Park sets out to intentionally react tungsten (W) with silicon (Si) to form WSi_x , whereas Applicants’ Specification specifically disfavors such reactions*, and discusses such reactions as representing known conventional problems, and further discusses the undesirability of such reactions. Applicants’ disclosure and claimed invention specifically set out to avoid the exact situation encouraged by Park et al.

No matter whether Park is relied upon as either the primary reference or the secondary reference in any unpatentability rejection, Park may not be properly combined with Desai et al. to render Applicants' claimed invention unpatentable, since *the aspects of Park which teach away from Applicants' claimed invention may not be ignored*, as long held by the Court of Appeals for the Federal Circuit and its predecessor courts, as discussed above.

Therefore, reconsideration and allowance of claims 1, 2, 4-8, 10, 15, and 21-27 are requested.

Conclusion

In view of the above, each of the presently pending claims 1, 3-8, 10, 15, and 21-27 in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

In the event that the Examiner believes that an interview would serve to resolve any remaining issues in this application, the Examiner is invited to contact the undersigned attorney at the telephone number indicated below.

Applicants believe that no fee is due with this response. However, if a fee is due, please charge IBM Deposit Account No. 09-0456, under Order No. 21806-00115-US from which the undersigned is authorized to draw.

Respectfully submitted,

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